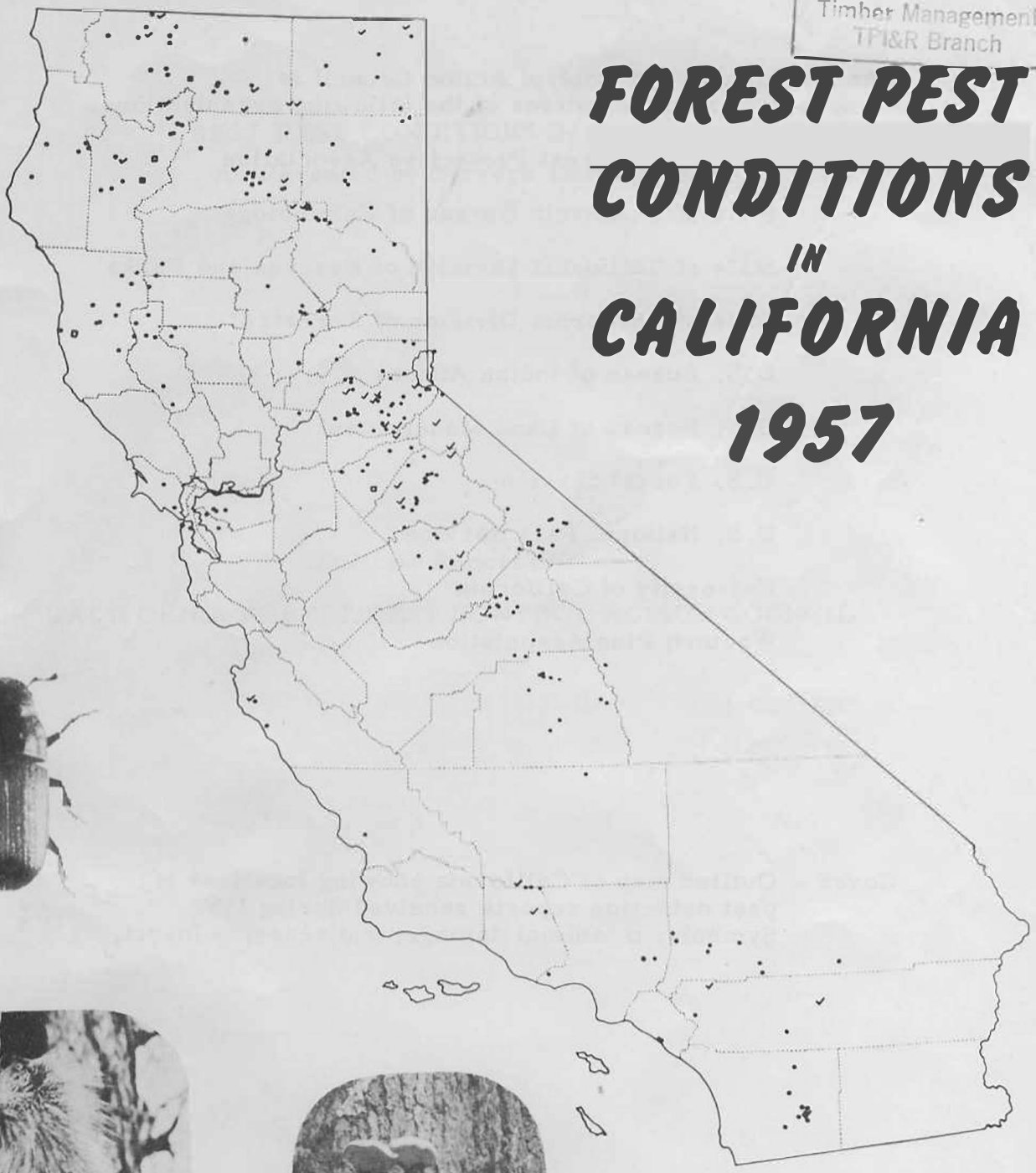
901.01

File Cpy - DN. T.M.
900.00 RY

F. S. R-5
RECEIVED
MAY 16 1958
Timber Management
TPI&R Branch

FOREST PEST CONDITIONS IN CALIFORNIA 1957



TIMBER MANAGEMENT
FILE COPY cc Pierce
6 cc attached

The California Pest Control Action Council is composed of representatives of the following organizations:

California Forest Protective Association

State of California Bureau of Entomology

State of California Division of Beaches and Parks

State of California Division of Forestry

U. S. Bureau of Indian Affairs

U. S. Bureau of Land Management

U. S. Forest Service

U. S. National Park Service

University of California

Western Pine Association

Cover - Outline map of California showing locations of pest detection reports received during 1957. Symbols: ▫ animal damage; ✓ disease; • insect.

Prepared by the California Forest and Range Experiment Station in cooperation with other members of the Council. Printed and distributed by California Division of Forestry. Additional copies available from either of these sources.

FOREST PEST CONDITIONS IN CALIFORNIA

As Revealed by Surveys During 1957

Official Report of the

CALIFORNIA FOREST PEST CONTROL ACTION COUNCIL

Sacramento January 1958

CONTENTS

	Page
Summary of Forest Pest Conditions During 1957	3
Surveys of Forest Pest Damage.	4
Status of Major Forest Insect Pests During 1957	5
The Insect Control Program Endorsed for 1958	13
Accomplishments of Recent Control Action	15
Status of Major Forest Diseases During 1957	18
Status of Forest Diseases and Recommended Action	24
Status of Forest Animal Pests During 1957	25

SUMMARY OF FOREST PEST CONDITIONS DURING 1957

FOREST INSECTS

Surveys in 1957 showed that losses from forest insects were substantially higher, both in volume and value, than in 1956. The total volume killed is estimated to be 1,554-million board-feet. The estimated stumpage value of this loss is 28 million dollars. Forty-four percent of the volume and 72 percent of the value were in pine species. The balance was in Douglas-fir and true fir.

Despite the heavy killing of timber by insects this year, prompt salvage reduced the net economic loss. Most major timber operators in the pine region logged some bark-beetle-infested trees, either as part of their main operations, or through special programs where their full potential was directed toward controlling bark beetles. In addition, many operators helped to control bark beetles indirectly through sanitation-salvage.

The status of major insects was:

WESTERN PINE BEETLE in ponderosa pine increased greatly, particularly around 1955 burns.

MOUNTAIN PINE BEETLE in sugar pine likewise increased; in lodgepole pine, outbreaks in the high Sierras continued.

LODGEPOLE NEEDLE MINER remained epidemic in the same lodgepole forests infested by the mountain pine beetle.

DOUGLAS-FIR BEETLE in Douglas-fir increased slightly in northwestern California.

RED TURPENTINE BEETLE, in association with the western pine beetle and mountain pine beetle, was very abundant.

CALIFORNIA FLATHEADED BORER in ponderosa and Jeffrey pine epidemic in southern California and abundant elsewhere.

FIR ENGRAVER epidemic in true firs only in a few local areas.

CONE AND SEED INSECTS damaged extensively the very light cone crop of 1957.

DOUGLAS-FIR TUSSOCK MOTH in true firs and PINE ENGRAVERS in pines did very little damage.

FOREST DISEASES

The 1957 survey revealed damage from forest diseases was comparable to that reported for 1956. Heart rots, dwarfmistletoe and white pine blister rust continue to be the most destructive disease pests in the State. Since the 1957 survey was on a bigger scale than the 1956 work, but with the same thoroughness, this year's damage estimates have greater significance.

The status of major diseases was:

DWARFMISTLETOE losses in red fir and sugar pine were as severe and as extensive as in 1956; dwarfmistletoe damage to Douglas-fir was found in Siskiyou County.

ELYTRODERMA NEEDLE DISEASE of ponderosa and Jeffrey pines persists in noteworthy amounts in the Sierra Nevada, causing serious damage in some areas; damage in Coast Range ponderosa pine stands continued.

WHITE PINE BLISTER RUST continued to intensify in varying degrees throughout most of its range in the State. The known location of the rust was extended 20 miles south in the Coast Range with the discovery of a sugar-pine infection center in Tehama County.

LIMB BLISTER RUST on Jeffrey pine caused heavy damage from Mammoth Lakes southward to Riverside County.

YELLOW WITCHES' BROOM in red fir was found throughout most of the Sierra Nevada; heaviest infections noted were in Tulare County.

FOREST ANIMALS

Information on damage due to forest animals was incomplete. The status of the two animal pests reported was:

SEED EATING RODENTS very abundant in the fall; likely to cause damage in coniferous regeneration areas in 1958.

PORCUPINES most injurious to ponderosa and Jeffrey pine in northern California.

SURVEYS OF FOREST PEST DAMAGE

This report is based largely on information supplied to the California Forest and Range Experiment Station from State, private, and Federal cooperators. These cooperators note and report on pest conditions in their local areas. Their observations on any unusual insect, disease, or animal damage are submitted on a standard "Field Detection Report of Pest Damage." These detection reports are screened by the Station, and if the situation reported appears to be serious, an entomologist or pathologist from the Station visits the area to aid the land manager in an appraisal of the damage. An appraisal report is prepared to advise the land owner or manager as to the insect or disease responsible, possible effects of the pest on the remaining stand, and what control methods might be used. The cooperative pest detection program is sponsored by the California Forest Pest Control Action Council.

Pest detection has been very effective in 1957. During the year, 271 Field Detection Reports were received, a noteworthy increase over the 120 received during 1956. Of the 271 total for 1957, 226 were on insects, 40 on diseases, and 5 on animals. The quality, as well as the quantity, of the current reports has greatly improved, and the coverage of the State this year was the best on record. The total number of disease detection reports is still too small for adequate statewide appraisal; more reports would be helpful, especially in the north coast area. Animal damage reports have been few, and better detection of the depredations of animals is another phase of the progr

which needs to be improved. Geographically, southern California and northwestern California are the two parts of the State where the detection program needs to be strengthened most.

To supplement detection of forest pest activity from the ground, the Station, in cooperation with the California Division of Forestry and private industry, carried on an aerial reconnaissance of the State's forested areas during the spring and late fall. Approximately 100 hours of flying was done this year. A Cessna 180 airplane with a pilot was made available by the administrative branch of the U.S. Forest Service for most of this work. The observer crew included one or two men from the Station and one man from the California Division of Forestry. In some cases private industry supplied a plane and one of the Station observers accompanied a company forester on the aerial inspections. In other cases private industry made their own inspection of company lands. Of the 100 estimated hours of flying, the Station was directly responsible for 77 hours.

Strengthening of the aerial phase of the cooperative pest detection program is needed in the period ahead. Because it was impracticable to ground-check some suspicious areas soon after the 1957 aerial inspection was made, some important infestations expanded unnoticed. More prompt ground-checking is needed as well as more assistance from local foresters in making aerial surveys.

There were some important changes in the administrative responsibility for technical supervision of pest control projects during the past season. Formerly, the Experiment Station was responsible for providing technical supervision on all insect control projects financed by Forest Pest Control Act funds in California. The Station still has this responsibility for projects on U.S. Department of Interior land, but has been relieved of this responsibility on other ownerships. The administrative branch of the Forest Service is now primarily responsible for technical supervision, as well as the operational phases, of national forest projects and those on State or private land in which expenditures of federal funds are involved. The Regional Office has added one man to its staff to handle this added responsibility, and the State Division also has added a man full time on insect and disease problems on State and private land. This arrangement has permitted the Station to devote more time to strengthening and improving detection and appraisal surveys.

STATUS OF MAJOR FOREST INSECT PESTS DURING 1957

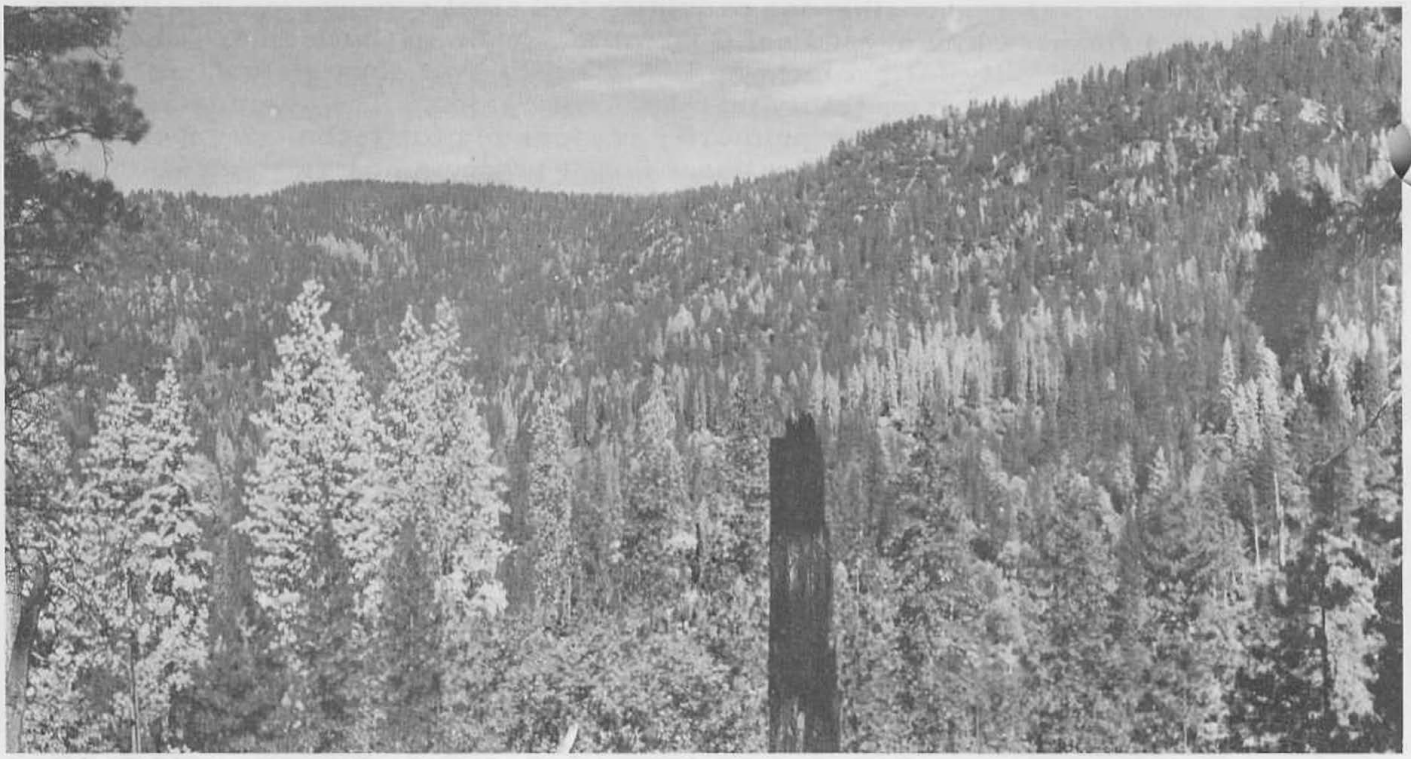
WESTERN PINE BEETLE

In several areas of the State, the western pine beetle (Dendroctonus brevicomis Lec.) in ponderosa pine occurred in outbreak proportions and caused serious damage. Losses in these areas showed a considerable increase throughout the whole westside Sierra timber belt and in portions of the Coast Range pine belt. The principal outbreaks known are as follows:

1. McGee Burn - Tulare and Kern Counties. --A serious outbreak developed around the 16,530-acre McGee Burn early in the summer of 1957, as a result of a buildup of beetles in trees weakened by the 1955 fire. Surveys showed that the outbreak covered about 73,000 acres, and contained an estimated 7,750 infested trees comprising about 6.1 million board-feet of merchantable timber. About 60 percent of this loss was ponderosa pine killed by the western pine beetle. The remainder was sugar pine killed by the mountain pine beetle, to be discussed later. This is the most serious pine bark-beetle infestation in California since the 1944-45 Burney-McCloud infestation.

About 5,200 of the beetle-killed trees occurred on about 4,000 acres of Sequoia National Forest land within the burn. Although most of these trees were small, in the aggregate they contained about 2 million board-feet. About 300 of the trees were in the Sequoia-Kings Canyon National Park in virgin timber outside of the burn. Of this number 200 were in the Grant Grove area and 100 on adjoining Park land. Many of these trees were mature veterans; their total volume was estimated to be about 1 million board-feet. On 640 acres of privately owned cutover land around Sequoia Lake, there were approximately 250 infested trees containing about 100,000 board-feet. On the Sequoia National Forest land in virgin timber outside the burn, but within the zone of heavy group killing, about 2,000 infested trees containing a volume of about 3 million board-feet occurred. Considerable progress was made in controlling this infestation. About 4 million board-feet of infested timber

(A)



(B)

Figure 1. In pine stands seriously injured by fire (A), enormous bark-beetle populations often build up, then spread into and kill nearby green timber. (B), Salvaging fire-weakened trees promptly helps prevent beetle outbreaks.

were salvaged, and another million board-feet treated with chemicals. The National Park Service, the U.S. Forest Service, the California Division of Forestry, and private owners cooperated in this endeavor. Further control action is likely to be necessary to mop up this infestation in the spring of 1958.

2. Haystack and Six Mile Burns - Siskiyou County. --A situation similar to that in the McGee Burn occurred around the Haystack and Six Mile Burns of 1955 on the Klamath National Forest and intermingled private land. The fire extended over 87,000 acres on the Haystack Burn and 5,200 acres on the Six Mile. Preliminary surveys showed that the bark-beetle infestation around these burns covered more than 100,000 acres. Several thousand trees containing several million board-feet were infested. On the Haystack Burn most of the trees were ponderosa pine infested with the western pine beetle. Beetle damage in the Six Mile Burn was chiefly sugar pine killed by the mountain pine beetle. Although a formal appraisal of these outbreaks was not completed, a start was made on both areas to control the infestation by salvaging infested trees. Unless the infestations show a marked decrease during the winter months, it is likely that additional control action will be necessary in the spring of 1958.

3. Strawberry Valley - Yuba County. --A local outbreak developed on the Plumas National Forest and privately owned land in the Strawberry Valley area in midsummer. It involved mountain pine-bettle damage in sugar pine, as well as western pine beetle in ponderosa. Control through the salvage of infested trees has been underway since August and appears to have solved the problem.

4. Pinecrest-Tuolumne County. --An outbreak similar to the one at Strawberry Valley developed in the Pinecrest area on the Stanislaus National Forest and adjacent private lands. No control was undertaken, but a program of salvaging infested trees, combined with the use of chemicals, is contemplated around the high-use portion of the area.

Other areas where the western pine beetle, together with the mountain pine beetle, was in outbreak included the Forest Hill area in Placer County; the Sweetwater-Feliciana area, Mariposa County, the Wawona Basin-Tuolumne Grove area (Mariposa and Tuolumne Counties) in the Yosemite National Park; the Stoneyford-Paskenta area, Glenn and Tehama Counties; the Callahan area, Siskiyou County; and the Viola-Mineral area, Shasta and Tehama Counties.

Losses by the western pine beetle were substantially reduced throughout the east-side timber producing belt and southern California recreational areas where sanitation-salvage had been applied. In spite of the generally heavy damage due to this insect in untreated stands statewide, areas treated by sanitation-salvage sustained markedly reduced loss. For example, on the Blacks Mountain Experimental Forest, Lassen County, losses in untreated virgin stands of ponderosa pine this year were the highest in about 20 years, averaging 207 board-feet per acre. Losses in treated stands, however, averaged only 56 board-feet per acre. Damage by this insect in the southern California recreational area was held to a reasonably low level through sanitation-salvage coupled with maintenance control.

MOUNTAIN PINE BEETLE

The mountain pine beetle (Dendroctonus monticolae Hopk.) in sugar pine was very aggressive in 1957, as noted in the preceding section. It frequently was associated with the western pine beetle in the major outbreak areas and caused extensive damage. The principal areas where damage was critical included the McGee, Haystack,

and Six Mile Burns; and the Strawberry Valley, Pinecrest, Callahan, Stoneyford-Paskenta, Wawona Basin - Tuolumne Grove, and Viola-Mineral areas.

The mountain pine beetle in mature lodgepole pine continued in outbreak on the Dingley-Delaney Creek drainages, Tuolumne County, in Yosemite National Park. The trees in this area have been weakened by repeated defoliation caused by the lodgepole needle miner and are highly susceptible to bark-beetle attack. The current outbreak in Dingley Creek started in 1955 with 105 infested trees on about 500 acres. These trees were treated but this failed to reduce the loss. The following year about 250 trees were treated on about the same acreage. In spite of control, bark-beetle damage continued to increase. Surveys in 1957 disclosed that the infestation has now spread over about 4,400 acres, with an estimated 1,365 trees infested. Unless this infestation can be checked soon, most of the stand probably will be killed. Although damage is now limited to areas not heavily used for recreation, the southern portion of the infestation is only about four miles from the high-use Tuolumne Meadows recreation area.

The mountain pine beetle outbreak reported last year in lodgepole pine in the South Warner Mountains, Lassen County, continued unabated. Surveys in 1956 revealed an estimated 14,112 infested trees on 2,212 acres, all on Modoc National Forest land. An aerial survey in 1957 indicated that the infestation has continued at a very high level. Some decline was observed in the center of the outbreak area where nearly all the trees have been killed. No action was taken to control this outbreak because the high cost of control could not be justified by existing values involved.

JEFFREY PINE BEETLE

The Jeffrey pine beetle (Dendroctonus jeffreyi Hopk.) in Jeffrey pine continued to cause widespread damage in several portions of the State. The most serious damage occurred in the Cannel Meadows area of the Sequoia National Forest in Tulare County. An appraisal made early in 1957, revealed that 50 million board-feet of timber have been killed on 105,000 acres during the past 2 years by this and other associated bark beetles. The Jeffrey pine beetle was responsible for most of this loss, although the fir engraver in red and white fir and the mountain pine beetle in lodgepole pine contributed to the total. A sanitation-salvage logging program to reduce Jeffrey pine losses in this area has been started. Another area where the Jeffrey pine beetle has been causing heavy damage for the past two years is the Deadman Recreational Area in Mono County on the Inyo National Forest. A sanitation-salvage operation recently completed in this area should solve a major portion of the problem, provided maintenance control is carried on. Other areas where Jeffrey pine beetle outbreaks occurred were on Deer Mountain, also on the Inyo National Forest, and the Dodge Mine area on the Plumas National Forest, in Plumas County.

DOUGLAS-FIR BEETLE

In 1956, damage to Douglas-fir by the Douglas-fir beetle (Dendroctonus pseudotsugae Hopk.) reached a very low level, with practically no loss observed in the State. During the first part of 1957 losses remained low, but signs of an increase were reported early in the fall. Small, scattered groups of dead trees were observed near Happy Camp, Siskiyou County, and Orleans, Humboldt County. These were on the Klamath and Six Rivers National Forests in the same general areas where epidemics by the insect were experienced several years ago.

CALIFORNIA FLATHEADED BORER

The California flatheaded borer (Melanophila californica Van D.) continued in an epidemic status in pine stands in southern California. At Alamo Mountain, Ventura County, this insect and associated pine bark beetles were reported to be continuing

to cause extensive losses to timber on the Los Padres National Forest. Damage to Jeffrey pine, due to this insect was also serious around Mt. Laguna, San Diego County, on the Cleveland National Forest and intermingled private land. An appraisal survey of the Mt. Laguna area indicated that approximately 13,000 Jeffrey pine on some 7,500 timbered acres died in 1957. Of this total, 83 percent were infested with flatheaded borer larvae. The volume of timber infested per acre was estimated to be 150 board-feet, or 2.4 percent of the residual stand. Jeffrey pine mortality in the Laguna area is complicated by disease and drought. Dwarfmistletoe, in particular, is very abundant and was found to be consistently associated with trees infested with borers. In other forest areas in southern California where maintenance control has been carried on, or where sanitation-salvage has been conducted, losses due to this insect were minor.

PINE ENGRAVERS

Pine engraver (Ips spp.) damage in ponderosa and Jeffrey pine was generally low over the State as a whole. A few local outbreaks occurred in southern California. One was in Coulter pine near Julian, San Diego County; and another in Jeffrey pine near Wrightwood, San Bernardino County. Scattered loss in ponderosa pine also occurred in the Sierra foothills in the northern part of the State.

FIR ENGRAVER

Losses from the fir engraver (Scolytus ventralis Lec.) in white and red fir were moderate for the State as a whole, with some tendency toward local epidemics around Pinecrest, Tuolumne County and at Cannel Meadows on the Sequoia National Forest.

RED TURPENTINE BEETLE

In 1956 the red turpentine beetle (Dendroctonus valens Lec.) was the only insect reported to be increasing on ponderosa and sugar pine around many of the 1955 burns. No tree-killing due to this insect alone was observed. In 1957 the red turpentine beetle was again abundant, but this year it was seen most frequently in association with western pine beetle and mountain pine beetle infestations, particularly around the McGee and Haystack Burns.

DOUGLAS-FIR TUSSOCK MOTH

The 10,000-acre outbreak of Douglas-fir tussock moth (Hemerocampa pseudotsugata McD.) in white fir in Tuolumne County, which was controlled with DDT sprays in 1956, showed no signs of recurring. Surveys disclosed very little evidence of tussock moth feeding on the 1957 foliage, and no larvae, pupae, adults or egg masses could be found. Many trees were practically stripped of needles during the outbreak; and subsequent studies have shown that some mortality resulted. In the most heavily defoliated stands, 21 percent of the trees have already died. One-quarter of the dead trees died as a direct result of defoliation; the balance succumbed to the combined effects of defoliation and the attacks of other insects. Less than one percent of the trees were killed in moderately and lightly defoliated stands.

LODGEPOLE NEEDLE MINER

The lodgepole needle miner (Recurvaria milleri Busck) continued in outbreak on some 50,000 acres of the upper Tuolumne and upper Merced River drainages in Yosemite National Park. The year 1957 was a flight year for the moths, and the insect intensified its attack in areas lightly infested by the previous generation. The infestation also increased in new areas and extended in an easterly direction for a distance of at least 2 miles. Samples taken late in the year showed high populations of young larvae of the 1957-59 generation in the needles. In the older areas of heavy infestation, the needle miner population declined, but in areas of recent heavy infestations there were sharp increases. Populations of young larvae in all areas were

of outbreak proportions, ranging from 12.7 to 47.4 larvae per tip. In experiments with oil sprays of malathion applied by helicopter to control the infestation, doses of 2 lbs. in 20 gals. per acre reduced the number of newly hatched larvae by about 70 percent.

No observations were made in 1957 of the lodgepole needle miner infestation in the Sequoia-Kings Canyon National Park. A new center of infestation, believed to be either this insect or one very similar to it, was found on the Inyo National Forest at Sentinel Meadow, Mono County

Figure 2. Helicopter applying malathion spray to lodgepole pine in Yosemite National Park to control the lodgepole needle miner.

TWIG BEETLES

Tip-killing of mature native conifers - notably ponderosa, Jeffrey and sugar pine, white fir and incense-cedar - was very extensive from Shasta County to Fresno County. Twig beetles (Pityopthorus spp.) were associated with some of the damage, and in one case involving ponderosa pine, adults of the small western ips, (Ips latidens (Lec.)), were reared from the dead tips. Adverse climatic factors may have been responsible in part for the damage.

PINE SAWFLIES

Defoliation of ponderosa and Jeffrey pine by sawflies (Neodiprion spp.) was very heavy in two local plantations in the State. One small infestation was on the Howard Forest, near Willits, Mendocino County. The other and larger infestation was in the Shasta brushfield plantings near Mt. Shasta, Siskiyou County. In both outbreaks sawfly larvae stripped practically all of the old foliage from the trees in late May and early June.

OTHER IMPORTANT INSECTS

Seed and cone insects caused very serious damage to a generally very light pine cone crop in the fall of 1957. It is estimated that 85 to 90 percent of the sugar-pine cone crop statewide was destroyed by the sugar-pine cone beetle, Conophthorus lambertianae Hopk. The seed crop of Jeffrey pine was reduced by seed worms Laspeyresia and Hedulia spp., about 80 percent. Damage from these insects was so severe on the

Figure 3. Tip-killing in ponderosa pine attributed to twig beetles.

Inyo National Forest that plans for the collection of a large volume of cones had to be cancelled. There was practically no ponderosa pine cone crop this year, but such cones as were produced were almost completely destroyed by cone moths. A very light Douglas-fir seed crop was almost completely destroyed by insects. Gall midges, probably Rubsaamenia sp., were the most abundant. The cones were also heavily infested by Dioryctria and Barbara species. Many of the seed were destroyed by the Douglas-fir seed chalcid, Megastigmus spermotrophus Wachtl. The cone crop in true fir was generally fair, statewide, but damage from insects was very high.

The pine reproduction weevil, Cylindrocopturus eatoni Buch., continued to cause serious damage to local pine plantations. One new center of infestation was detected at Tony Gulch, in a small hybrid outplanting on the Eldorado National Forest. The trees affected consisted of a combination of Jeffrey, Coulter, Apache, Arizona and ponderosa pine. The reproduction weevil has periodically caused rather serious damage to ponderosa and Jeffrey pines planted in Mt. Shasta brushfield, Siskiyou County. In 1952 control was undertaken on about 2,000 acres, using DDT applied at the rate of 1 pound in one gallon of oil carrier. In 1956 another outbreak occurred on about 400 acres where 18.5 percent of the residual trees were currently infested with the insect. Control was undertaken in June 1957 to check the damage.

A native pine tip moth (probably Rhyacionia sp.) caused moderate damage in two young plantations of ponderosa pine on the Modoc and the Eldorado National Forests. Fifteen percent of the tips were estimated to be infested in the Modoc plantation; no estimate was made for the Eldorado. The white-fir sawfly, Neodiprion abietis (Harr.) complex, a pest of white fir and red fir, did not cause serious damage in 1957. Infestations of the black pine-leaf scale, Aspidiotus californicus Colm. were found on ponderosa pine near Crestline, San Bernardino County, and on Jeffrey pine near Susanville, Lassen County. This insect was discovered for the first time to be causing a severe yellowing of the foliage in mature and overmature sugar pines in local areas on the Trinity and Eldorado National Forests. Scale infestations were so heavy on some trees that they caused crown discolorations similar to initial fading in bark-beetle-attacked trees. The needle-sheath miner, Zelleria haimbachi Busck, again was in outbreak at the Institute of Forest Genetics, Placerville, on various species of pines and their hybrids. A portion of outbreak was successfully controlled through the use of malathion sprays in late May. The Great Basin tent caterpillar, Malacosoma fragile (Stretch), caused heavy defoliation to several thousand acres of mixed brush species including manzanita, whitethorn, tobacco brush and bitter cherry, between Westwood and Chester, Lassen and Plumas Counties. Defoliation greatly

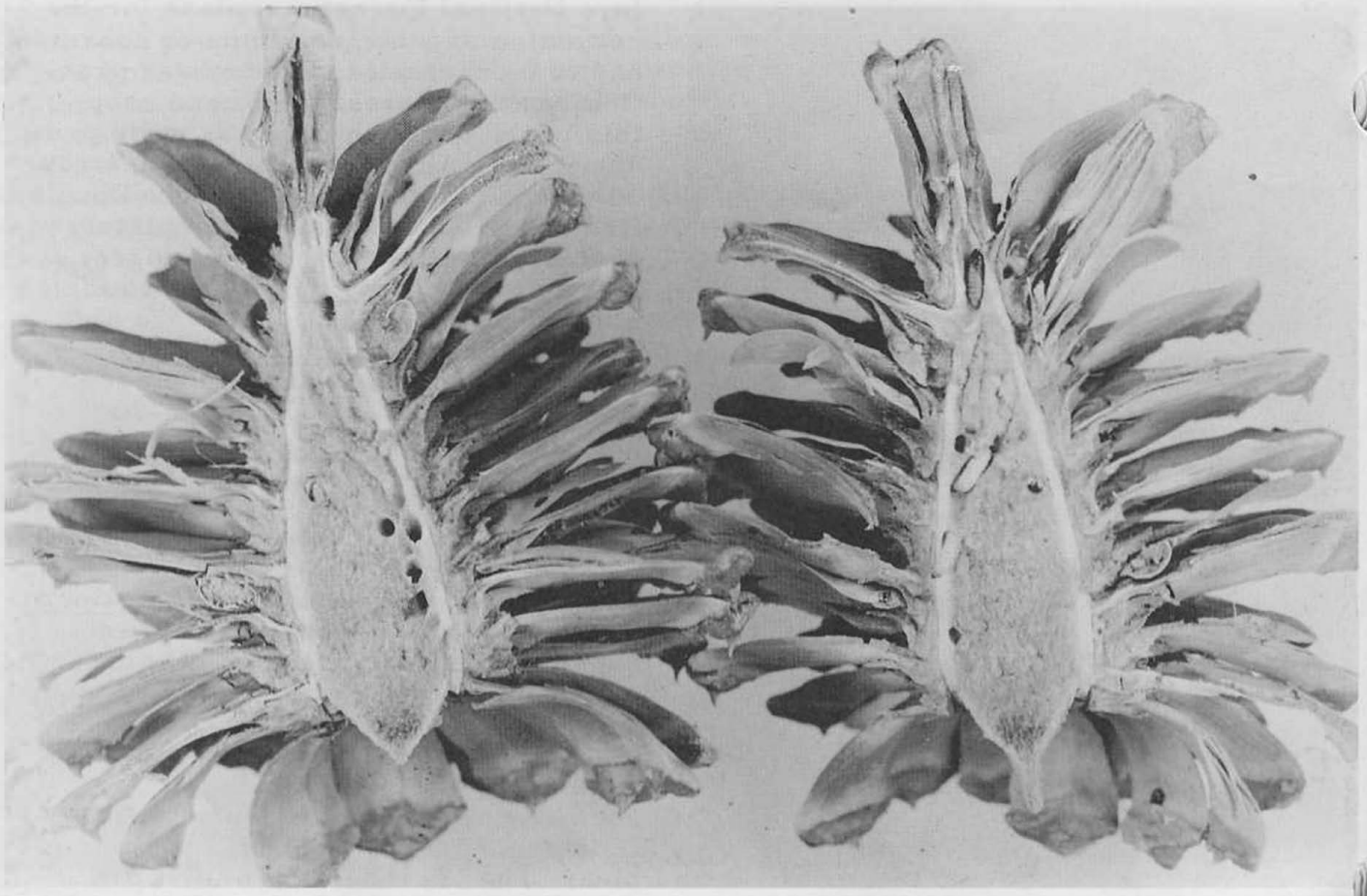


Figure 4. Jeffrey pine cones riddled by insects.

reduced the values of the brush for browse in this area in 1957 and may cause subsequent mortality. The pandora moth, Coloradia pandora Blake, was found in the egg and small larval stage on Jeffrey and Coulter pine in the Laguna Mountains, San Diego County, late this fall. The insect has been reported from this same area previously, first in 1940 and again in 1956, but thus far has not caused extensive damage. Because of its increased abundance in 1957, there is a possibility of severe defoliation during the next two years, since the insect has a 2-year life cycle.

Spruce needle miner, Taniva albolineana (Kearf.), a destructive introduced pest, was found for the first time on ornamental blue spruce in and around Alturas, Modoc County, early in 1957. This needle miner at times does considerable damage to Engelmann, blue, and Sitka spruce. It is widely distributed throughout the Eastern States and Canada and has been reported from Colorado, Idaho, Oregon, Washington and British Columbia. Since the insect is restricted to spruce, it is not considered a threat to California native conifers. Steps were taken by the State Bureau of Entomology to eradicate the infestation at Alturas.

A survey was undertaken in northwest California late this summer to determine if serious infestations of the balsam woolly aphid, Chermes piceae (Ratz.), occurred in fir stands in California. This European insect is in outbreak in the Pacific Northwest and has been reported causing damage as far south as Crater Lake in Oregon. It has been recorded as occurring in California, but the survey disclosed no evidence of infestations in this State in 1957. Since balsam woolly aphid's preferred western

hosts, Pacific silver fir and subalpine fir are absent or only occasionally found in California, the aphid is not expected to become a serious forest pest here. Pacific silver fir occurs in the Salmon Mountain, Siskiyou County, but subalpine fir has never been recorded in California.

Other miscellaneous forest insects reported or observed include a very heavy outbreak of the ponderosa pine resin midge, Retinodiplosis inopis (O.S.), in the Mt. Shasta brushfield planting on the Shasta National Forest; the Monterey pine weevil, Pissodes radiatae Hopk., in Monterey pine, Monterey County; the lodgepole terminal weevil, P. terminalis Hopp., in lodgepole pine in Shasta and Inyo Counties; the ceanothus silk moth, Hyalophora euryalus Bdv., defoliated bitter brush on the Inyo National Forest; and the mesquite flatheaded borer, Chrysobothris octocola Lec., associated with serious damage to mesquite on the Death Valley National Monument, Inyo County.

OTHER MISCELLANEOUS PROBLEMS

A serious blowdown in ponderosa and Jeffrey pine occurred in southern California on November 21 as the result of a severe Santa Ana wind. The hardest hit areas were on the San Jacinto District, San Bernardino National Forest, in Riverside County and the Cuyamaca Rancho State Park, in San Diego County. Approximately 240 merchantable trees were blown down in the San Jacinto area and about 500 on the Park. Other known localities where wind damage occurred included the Big Bear area, San Bernardino County and the Alamo Mountain area, Ventura County, but no information is available as to the number and volume of trees involved. Blowdowns create a serious potential for the buildup of primary insect populations, and a significant amount of insect loss can be anticipated unless prompt salvage of the blowdown can be achieved.

THE INSECT CONTROL PROGRAM ENDORSED FOR 1958

On October 25, 1957, the annual meeting of the California Forest Pest Control Action Council was held in Sacramento. The purpose of the meeting was to review the status of forest pests within the State, discuss progress on pest control, and consider proposed control projects for 1958. Table 4 contains a synopsis of current forest insect infestations requiring control and the Council's recommendations for action.

In discussing these projects special stress was laid on continued use of sanitation-salvage to the fullest extent practicable to control pine bark beetles. Also emphasized was the importance of salvaging infested trees as a means of bark-beetle control. The Council recognized that noteworthy progress is being made in harvesting and utilizing insect-susceptible timber before it is destroyed by insects. It endorsed the continued use of this approach to insect control areas like Alamo Mt. Continued surveillance of outbreaks, particularly known infestations around burns, and prompt control action as indicated by surveys was also endorsed by the Council.

Cognizance was taken of the fact that logging alone will not solve all insect problems, particularly defoliator outbreaks such as the needle miner outbreak in Yosemite National Park. Action to control this outbreak with sprays, if possible, and concerted efforts to check the epidemic of bark beetles that has developed in the defoliated trees was approved. In recreational forests of southern California, the Council advocated continued maintenance control to keep damage from insects to a minimum.

Figure 5. Part of the Barton Flats Recreational Area, San Bernardino National Forest, where beetle susceptible trees have been removed by sanitation-salvage without impairing recreational values.

ACCOMPLISHMENTS OF RECENT CONTROL ACTION

The following tables summarize the forest insect control and salvage activities of the major private, State and Federal forestry agencies in California in 1957.

TABLE 1.--VOLUME OF INSECT KILLED OR SUSCEPTIBLE TREES REMOVED BY PRIVATE LOGGING COMPANIES

Company	No. Acres	Infested Volume (M.B.M.)	Susceptible Volume (M.B.M.)	Tree Species
Associated	683	25	600	PP, SP
Big Bear	4,500	500	7,000	JP, PP, WF
Blagen	435	40	650	PP, SP
Crane Mills	2,200	40	3,000	WF, SP, PP
Diamond-Gardner	3,250	1,350	52,000	SP, PP, WF, DF
El Dorado Veneer		50		PP, JP, SP
Fruit Growers Supply	5,300	13,350	21,405	PP, SP, DF, WF, IC
Hearst Wyntoon Tree Farm	2,060	151	984	PP, DF, SP, WF, IC
Hughes Bros.	800	40		PP
Lorenz	640	50	100	PP
McCloud River	1,600	5,000	10,000	PP, WF
Meadow Valley	300		50	PP, SP
Michigan-California	1,000	10	500	PP, JP, SP
Placerville	400	20	100	PP, SP
Ralph L. Smith	800	200	3,000	PP, SP, DF, WF, IC
Scott	6,258	6,000	5,000	SP, PP, JP, DF, WF, IC
Shasta Forests	21,500	4,000	24,000	PP, DF, WF, IC
Snider-Lumber Products	2,400	235	105	PP, SP
Soper-Wheeler	3,000	450	10	PP, SP, WF, DF
Southern Pacific		384	56,174	PP, SP
Stockton Box	600	67		PP, SP
Trinity Alps	650	200	4,000	DF
U.S. Plywood	3,000	2,000	2,000	PP, SP, DF, WF, IC
Walker Forests	1,400	350	11,500	SP, PP, WF, DF
Westside	1,238	350	2,100	PP, SP
Total	64,014	34,014	207,278	

This is not intended to represent the total volume of infested or susceptible timber salvaged, but includes only those companies reporting their annual cut of insect susceptible or infested trees.

TABLE 2.--INSECT CONTROL PROJECTS ACCOMPLISHED ON STATE AND PRIVATE LAND IN 1957 UNDER THE STATE FOREST INSECT CONTROL LAW IN COOPERATION WITH TIMBERLAND OWNERS

Location	No. Acres	No. Trees	Insect	Host	Cost	Control Method
*Arrowhead-Crestline, San Bernardino Co.	15,849	201	Ips, Mc, Db, Dm, D	PP, JP, SP, CP	$ 9,074	Toxic spray
Cuyamaca State Park San Diego Co.	10,000	102	Ips, Mc, Db	PP, JP, CP	1,578	Toxic spray
*San Jacinto Riverside Co.	9,187	769	Ips, Mc, Db, D, Dm	PP, JP, SP, CP	9,076	Toxic spray, peel-burn
*Mill Potrero Kern Co.	46,080	491	Ips, Mc	JP, PP	5,200	Toxic spray
Osborne Hill Yuba, Nevada, Placer, El Dorado Cos.	752,640	1,240	Db, Ips	PP	9,908	Peel-burn
Sequoia-Kings Canyon Fresno and Tulare Cos.	138,240	40	Db, Dm	PP	400	Toxic spray
Total	971,992	2,903			$35,236	

*Work contracted to the U. S. Forest Service.

TABLE 3.--INSECT CONTROL PERFORMED BY FEDERAL AGENCIES DURING 1957

Location	No. Acres	No. Trees	Insects	Host	Control Method	Cost
			NATIONAL PARKS			
Lassen	1,300	9	DJ, Dm	JP, WP	Toxic spray, peel-burn	$ 191
Sequoia-Kings Canyon	17,000	381	Db, Dm, DJ	SP, PP, JP	Toxic spray, salvage	12,000
Yosemite	60,765	747	Db, Dm, DJ, Sv, Rm	PP, JP, SP, LP, WF	Fell-burn, toxic spray, aerial spray	38,500
	79,060	1,137				$50,691
			NATIONAL FORESTS			
Angeles	10,400	77 1/	Db, Dm, Ips, Mc	PP, JP, CP	Toxic spray	$ 596
Cleveland	4,200	528	Mc, Ips	JP	Toxic spray	4,900
Eldorado	8,000 2/	125	Db, Ips	JP, PP	Toxic spray	1,137
Inyo	700	36	Dm	LP	Toxic spray	750
Lassen	11,000	1,375	Db, DJ	PP, JP	Log infested trees	2,300
Los Padres	8,635	333	Mc, Db, Ips, DJ	PP, JP, CP	Toxic spray	6,861
San Bernardino	22,235	714	Mc, Ips, Db	PP, JP, CP, SP	Toxic spray	21,167
Sequoia	28,780	489 3/	Db, Dm	PP, SP, JP	Salvage and toxic spray	11,720
Shasta-Trinity	950	805	Ce, Db, Ips	PP, JP	Aerial spray and salvage, toxic spray	3,853
Tahoe	5,000	41	Db	PP	Toxic spray	494
	99,900	4,523				$53,778

1/ Plus 128 trees logged.
2/ Private land treated to protect Institute of Forest Genetics.
3/ Plus 3 million board-feet salvaged.

Key to Abbreviations Used:

Insects

Db - Western pine beetle
Dm - Mountain pine beetle
DJ - Jeffrey pine beetle
Rm - Lodgepole needle miner
Ips - Pine engravers
Mc - California flatheaded borer
Sv - Fir engraver
Ce - Pine reproduction weevil

Host Trees

PP - Ponderosa pine
SP - Sugar pine
LP - Lodgepole pine
JP - Jeffrey pine
CP - Coulter pine
WF - White fir
DF - Douglas-fir
IC - Incense-cedar

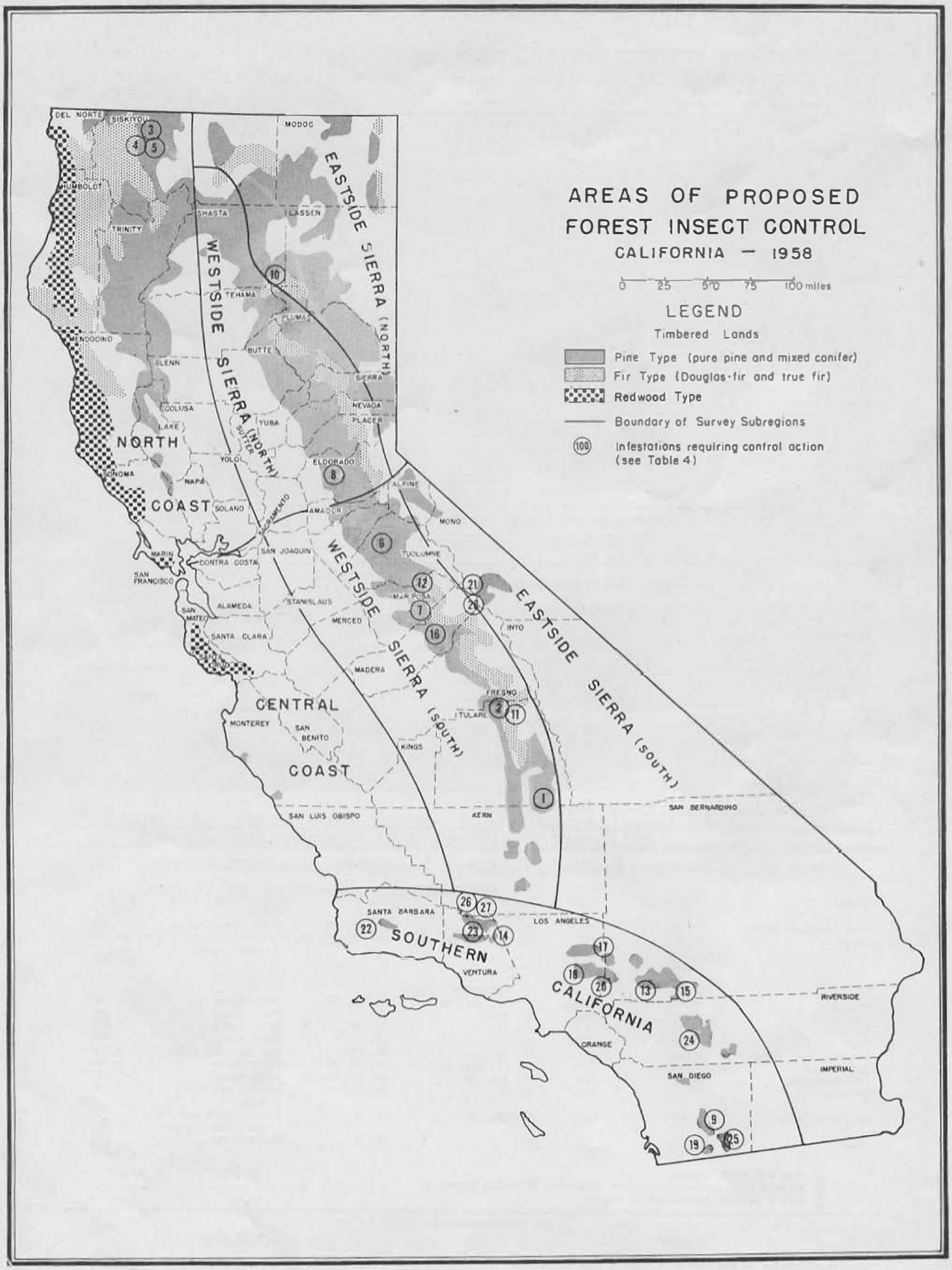

AREAS OF PROPOSED
FOREST INSECT CONTROL
CALIFORNIA — 1958
0 25 50 75 100 miles
LEGEND
Timbered Lands
Pine Type (pure pine and mixed conifer)
Fir Type (Douglas-fir and true fir)
Redwood Type
Boundary of Survey Subregions
(100) Infestations requiring control action (see Table 4)
NORTH COAST
CENTRAL COAST
SOUTHERN CALIFORNIA
WESTSIDE SIERRA (NORTH)
EASTSIDE SIERRA (NORTH)
WESTSIDE SIERRA (SOUTH)
EASTSIDE SIERRA (SOUTH)
DEL NORTE
SISKIYOU
MODOC
HUMBOLDT
TRINITY
SHASTA
LASSEN
TEHAMA
PLUMAS
MENDOCINO
BUTTE
GLENN
SIERRA
COLUSA
NEVADA
LAKE
YUBA
PLACER
SUTTER
YOLO
EL DORADO
SONOMA
NAPA
ALPINE
SOLANO
AMADOR
MONO
SACRAMENTO
MARIN
SAN JOAQUIN
TUOLUMNE
CONTRA COSTA
SAN FRANCISCO
MARIPOSA
ALAMEDA
STANISLAUS
SAN MATEO
MERCED
INYO
SANTA CLARA
MADERA
FRESNO
TULARE
MONTEREY
SAN BENITO
KINGS
SAN LUIS OBISPO
KERN
SAN BERNARDINO
SANTA BARBARA
LOS ANGELES
VENTURA
RIVERSIDE
ORANGE
SAN DIEGO
IMPERIAL

TABLE 4.--CURRENT FOREST INSECT INFESTATION AREAS REQUIRING ACTION

	PROJECT AREA	LOCATION	INFESTED ACREAGE	INSECT SPECIES CAUSING LOSS	HOST TREES KILLED	RECOMMENDED ACTION
				COMMERCIAL TIMBERLANDS		
(1)	Cannel Meadows	Tulare Co.	105,000	Jeffrey pine beetle Mountain pine beetle Fir engraver	Jeffrey pine Lodgepole pine White & red fir	Sanitation-salvage
(2)	McGee Burn	Fresno Co.	73,000	Mountain pine beetle Western pine beetle	Sugar pine Ponderosa pine	Salvage and toxic spray
(3)	Haystack Burn	Siskiyou Co.	90,000	Western pine beetle Mountain pine beetle	Ponderosa pine Sugar pine	Salvage and toxic spray
(4)	Six Mile Burn	Siskiyou Co.	6,000	Mountain pine beetle	Sugar pine	Salvage
(5)	Callahan	Siskiyou Co.	2,000	Mountain pine beetle	Sugar pine	Salvage
(6)	Pinecrest	Tuolumne Co.	2,500	Western pine beetle Mountain pine beetle	Ponderosa pine Jeffrey pine	Salvage and toxic spray
(7)	Sweetwater-Feliciana	Mariposa Co.		Western pine beetle Mountain pine beetle	Ponderosa pine Sugar pine	Salvage
				EXPERIMENTAL AREAS		
(8)	Institute of Forest Genetics	Eldorado Co.	500	Western pine beetle Pine engravers Needle-sheath miner	Ponderosa pine Pine hybrids	Maintenance control, spray with toxic oil
				STATE AND NATIONAL PARKS		
(9)	Cuyamaca Rancho	San Diego Co.	8,000	California flatheaded borer	Jeffrey pine	Maintenance control, spray with toxic oil
(10)	Lassen Volcanic National Park	Shasta and Lassen Cos.		Jeffrey pine beetle Western pine beetle Mountain pine beetle	Jeffrey pine Ponderosa pine Lodgepole pine	Maintenance control, spray with toxic oil
(11)	Sequoia-Kings Canyon National Parks	Fresno and Tulare Cos.	8,500	Western pine beetle Mountain pine beetle	Ponderosa pine Sugar pine	Maintenance control, fell-peel-burn, or spray with toxic oil
(12)	Yosemite National Park	Mariposa and Tuolumne Cos.	10,000	Western pine beetle Mountain pine beetle	Ponderosa pine Sugar pine	Maintenance control, spray with oil or fell-peel-burn
			5,000	Mountain pine beetle Lodgepole needle miner	Lodgepole pine Lodgepole pine	Toxic spray Aerial spray with malathion
				FOREST RECREATION AREAS		
(13)	Arrowhead-Crestline	San Bernardino NF	38,000	Mountain pine beetle Western pine beetle Pine engravers Jeffrey pine beetle	Ponderosa pine Coulter pine Jeffrey pine	Maintenance control, fell-peel-burn or toxic spray, salvage
(14)	Alamo Mountain	Ventura Co.	6,500	Jeffrey pine beetle California flatheaded borer Western pine beetle	Jeffrey pine Ponderosa pine	Sanitation-salvage logging, to be followed by maintenance control
(15)	Barton Flats	San Bernardino Co.	7,500	Western pine beetle Jeffrey pine beetle	Ponderosa pine Jeffrey pine	Maintenance control. Use salvage as much as possible
(16)	Bass Lake	Madera Co.	600	Western pine beetle Pine engravers	Ponderosa pine	Maintenance control, fell-peel-burn or toxic spray
(17)	Big Pines	Los Angeles Co.	2,500	California flatheaded borer	Jeffrey pine	Maintenance control. Use salvage as much as possible
(18)	Charlton Flats	Los Angeles Co.	3,000	Western pine beetle Pine engravers California flatheaded borer	Ponderosa pine Coulter pine Jeffrey pine	Maintenance control, fell-peel-burn or toxic spray, salvage
(19)	Corte Madera	San Diego Co.	1,600	Western pine beetle Pine engravers California flatheaded borer	Coulter pine Jeffrey pine Ponderosa pine	Maintenance control, fell-peel-burn or toxic spray
(20)	Crystal Lake	Los Angeles Co.	1,100	Western pine beetle Mountain pine beetle Jeffrey pine beetle	Ponderosa pine Sugar pine Jeffrey pine	Maintenance control, fell-peel-burn or toxic spray
(21)	Deadman Summit	Inyo N.F.	10,000	Jeffrey pine beetle California flatheaded borer	Jeffrey pine	Maintenance control. Use salvage as much as possible
(22)	Figueroa Mountain	Santa Barbara Co.	600	Western pine beetle	Ponderosa pine Coulter pine	Maintenance control, fell-peel-burn or toxic spray
(23)	Grade Valley	Ventura Co.	5,000	California flatheaded borer	Jeffrey pine	Maintenance control. Use salvage as much as possible
(24)	Idyllwild-San Jacinto	Riverside Co.	14,500	Calif. flathead borer Western pine beetle Pine engravers Mountain pine beetle	Sugar pine Ponderosa pine Coulter pine Jeffrey pine	Maintenance control, fell-peel-burn or toxic spray, salvage
(25)	Laguna Mountain	San Diego Co.	1,500	Western pine beetle Calif. flathead borer	Coulter pine Jeffrey pine	Maintenance control, fell-peel-burn or toxic spray, salvage; experimental field tests.
(26)	Mount Pinos	Ventura Co.	2,500	California flatheaded borer	Jeffrey pine	Continued sanitation-salvage with maintenance control
(27)	Mill Potrero	Kern Co.	110	Calif. flathead borer Pine engraver	Jeffrey pine	Salvage, toxic spray - salvage logging
(28)	Reds Meadow and Tunnel Meadow	Inyo N.F.	700	Mountain pine beetle	Lodgepole pine	Maintenance control, spray with toxic oil

TRUE FIR DWARFMISTLETOE

This form of dwarfmistletoe (Arceuthobium campylopodum Engelm. f. abietinum) was found in nearly all of the red fir stands examined. Heavy damage in many of the old-growth stands is quite apparent in the Sierra Nevada from Plumas County southward to Kern County. The greatest damage in the northern end of the State was reported from Siskiyou and Trinity Counties, where mortality is clearly evident in mature and overmature red fir stands. Dwarfmistletoe is present in varying amounts in most white fir stands, but damage to this species is considerably less than noted for red fir. In old-growth stands of both firs, dwarfmistletoe causes cankers which afford portals of entry for heart rot fungi and predispose the trees to breakage at these points.

SUGAR PINE DWARFMISTLETOE

The dwarfmistletoe that attacks western white and sugar pine (A. campylopodum f. blumeri A. Nelson) is patchy in distribution and in sugar pine stands is most commonly found on young trees. There are a few places where mature trees are heavily infected over sizable areas. One of these spots is in the upper Mokelumne River drainage where many sugar pine trees are being weakened to the point where they are being killed by dwarfmistletoe alone. In other places this killing process of large trees is being speeded up by the mountain pine beetle. There are spots within the Mokelumne drainage where at least half of the merchantable sugar pine has already been killed. Dead sugar pine and retarded growth have been observed from Siskiyou County south through Nevada County.

HARD PINE DWARFMISTLETOE

All of the hard pines (ponderosa, Jeffrey, Monterey, and Coulter pines) throughout the State are attacked by hard pine dwarfmistletoe (A. campylopodum Engelm. f. campylopodum). Generally this parasite deforms and retards the growth but occasionally it causes serious mortality of ponderosa and Jeffrey pines in rather localized areas.

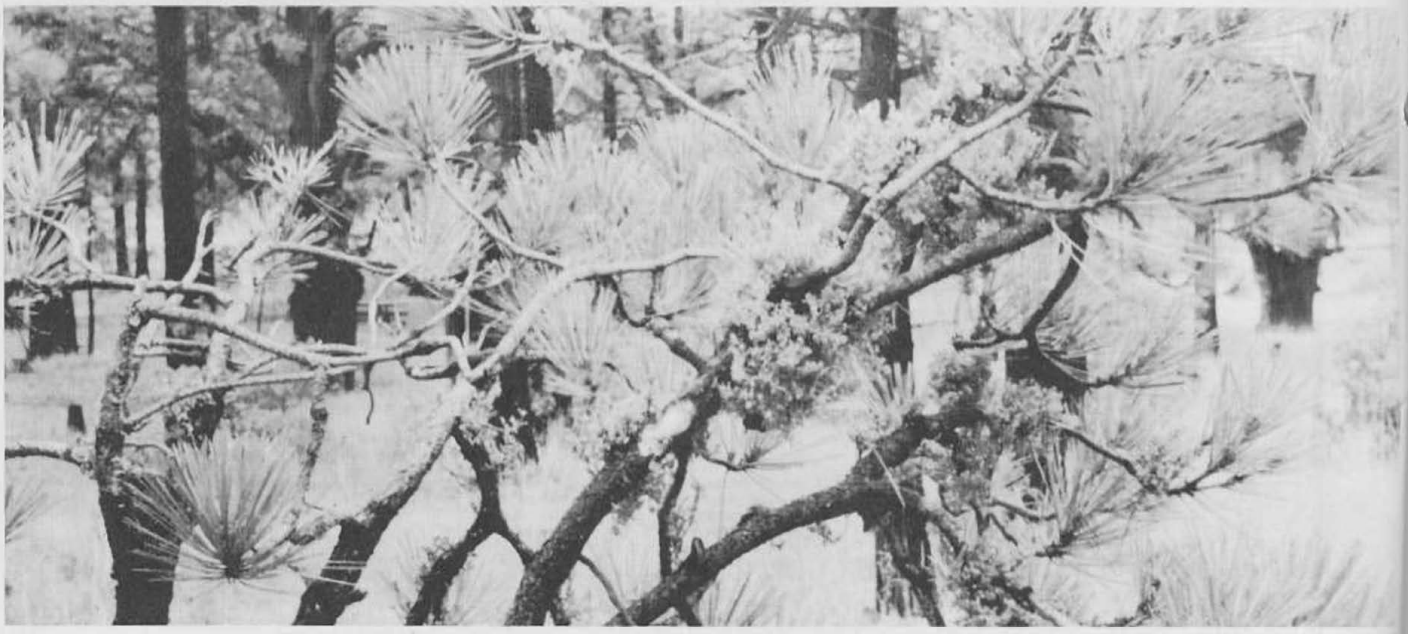


Figure 6. Damage and malformation on Jeffrey pine caused by dwarfmistletoe. Note rodent chewing on central stem.

One heavy infection center of several hundred acres is being studied in eastern Plumas County. An estimated one-fourth of the young pine on this logged-over area has been killed during the past five years by dwarfmistletoe. Widespread damage to Monterey pine was reported from Monterey County. Dwarfmistletoe and insects working in combination are causing growth reduction and mortality on about 2,000 acres of Jeffrey and Coulter pine in the Laguna Mountain area (San Diego County) in southern California. This form of dwarfmistletoe continues to kill digger pine at many locations throughout the tree's range. Forest managers are greatly concerned about damage to digger pine in recreational areas of the Kern River Canyon. Digger pine is the only tree of consequence in many of the campgrounds.

DOUGLAS-FIR DWARFMISTLETOE

Dwarfmistletoe (A. douglasii Engelm.) was found on Douglas-fir in mature stands of both Siskiyou and Trinity Counties. Some of the trees are dead or dying while others are deformed and weakened by massive witches' brooms resulting from multiple infection. Dwarfmistletoe rarely occurs on the coastal form of Douglas-fir and has not yet been found south of Plumas County in the Sierra Nevada.

Figure 7. Mature Douglas-fir in advanced stages of damage from dwarfmistletoe. Note typical brooms caused by this pest.

ELYTRODERMA NEEDLE DISEASE

Ponderosa and Jeffrey pine stands throughout much of the State again showed varying degrees of infection by the Elytroderma needle disease (Elytroderma deformans (Weir) Darker). The disease tends to recur and to increase in cool, moist places in the Sierra Nevada especially in Tuolumne and El Dorado Counties. Elytroderma

is still very much in evidence at the Manzanita Lake recreation area in the Lassen Volcanic National Park, at the recreational area along the southwest side of Lake Tahoe, at Evans Flat in Kern County, in the Mokelumne River drainage, and in Glenn County. Light infections were reported from both Siskiyou and Trinity Counties.

WHITE PINE BLISTER RUST

The status of white pine blister rust (Cronartium ribicola Fischer) at the end of the 1957 season was about the same as it was at the end of the previous year. On a regional basis the degree of buildup of the rust on pine can be compared to the area of a triangle whose apex is at Dodge Ridge (the southernmost known pine infection) and whose base is in the northwestern portion of the State. The prevalence and activity of the disease increases at a fairly uniform rate from south to north. Outside of established control units the rust buildup varies in its intensity from a low level at those infection centers within the outer 20-30 mile zone of spread (particularly in its southern sector of spread) to a nearly 100 percent level of infection at those spots in the northern end of the State that harbor conditions highly favorable for rust development.

In 1957 the known southward spread of the rust on pine in the Coast Range has been extended about 20 miles farther south with the discovery of an infection center in the Elder Creek drainage in the southwestern portion of Tehama County. This is in the northeastern portion of the Mendocino National Forest and is the first time infected pine has been found on this Forest. The center, although not found until 1957, is of 1944 origin. Seventy infected sugar pine trees were found here, and these were confined to an area of about 10 acres.

Mature sugar pine in the Elbow Springs area south of Clear Creek in western Siskiyou County are heavily infected. In fact many have been so weakened by the rust that insects have moved in and finished killing them. This is also happening but to a lesser extent on the ridge between Thompson and Indian Creeks. The rust is not yet severe enough on the mature sugar pine in either area to have caused their death, but it did weaken them to the point where they were prime targets for the insect attack.

The rust continues to build up on two of the high elevation white pines (western white pine and whitebark pine) in the northern end of the State. No infection has yet been found on foxtail pine.

Surveys showed that there was no long distance spread of the rust from pine to ribes during the spring of 1957. The rust pattern revealed by the many rust samples submitted for laboratory check showed that most of the spread from pine to ribes occurred in the immediate vicinity of sporulating cankers. Although the spread in the northwestern portions of the State was somewhat greater, it seldom exceeded a mile.

PINYON BLISTER RUST

The spread of pinyon rust (Cronartium occidentale Hedgcock, Bethel & Hunt) from pinyon trees east of the Sierra Nevada to ribes on the west slope was spotty and generally of light intensity. Pinyon rust was rather common on ribes over much of the mixed conifer type of Tuolumne and Calaveras Counties. In other parts of the Sierra Nevada it was found only at those areas harboring conditions highly favorable to rust incidence and development. No pinyon rust on ribes was reported from the Coast Range sugar pine belt. Although the rust eventually kills most of the pinyon pines that become infected, the annual mortality for the species as a whole is low, because few infection centers exist.

The importance of this rust is in the overlapping of its range in the uredial and telial stages on ribes bushes with that of white pine blister rust. In these stages rust samples must be submitted to the laboratory for identification. Under certain conditions the pattern of spread of pinyon rust is an indicator of where white pine blister rust can be found.

LIMB BLISTER RUST

The limb rust (Peridermium filamentosum Peck) is still causing heavy damage to some Jeffrey pine stands on the east side of the Sierra Nevada from Lake Tahoe to Riverside County. The Cannel Meadow area (Tulare County) on the Sequoia National Forest probably has the greatest mortality, mainly because of the attack by bark beetles on the weakened trees. The heavy damage at Mammoth Lake area in Mono County and at San Jacinto Wild Area in Riverside County looks about the same this year as it did last year. An occasional infected ponderosa pine was reported from southwestern Kern County.

STALACTIFORME RUST

The Stalactiforme rust (Peridermium stalactiforme Arth. et Kern), which generally does not cause serious losses, is fairly widespread throughout the State. In some eastside areas, Jeffrey pine is being damaged. In other places the growth of lodgepole pine is being retarded by this rust. In one area of about 50 acres (Kings Meadow in El Dorado County) practically all the young lodgepole pine trees are infected, although little damage was apparent in that rust center.

COMANDRA BLISTER RUST

This rust (Cronartium comandrae Peck) has been known to cause severe damage to ponderosa pine in local areas in the past. One of these is near Ball Mountain in Siskiyou County. No new infection centers of this rust were reported in 1957.

GALL RUSTS

Increased reports were received this year about damage to plantations and young natural reproduction caused by the gall rusts. Lodgepole, Monterey, digger and ponderosa pines are susceptible hosts.

YELLOW WITCHES' BROOM

Large witches' brooms caused by Melampsorella caryophyllacea Schroet. in red fir were observed from Placer County southward in the Sierra. Although this disease is fairly widespread, it seldom kills other than small trees. A heavily infected tree, however, is often weakened to the point where it is subject to attack either from insects or other fungi. The Cannel Meadow area of Tulare and Kern Counties supports one of the heaviest known infections of this rust. Yellow witches' broom was reported in lesser amounts from Siskiyou County southward. It was reported on white fir in the Doggett Creek drainage in Siskiyou County. A fairly heavy

Figure 8. Gall rusts of lodgepole and Monterey pine damage and kill many trees in plantations and young natural stands.

center on white fir was reported from the Little Haskell Creek drainage near Gold Lake in Sierra County. Light infections were also reported from Lassen and Plumas Counties.

FIR NEEDLE CAST

Fir needle casts, a matter of some concern to the Christmas tree industry, were observed at several places in the Sierra Nevada from Shasta County southward. These needle casts are caused chiefly by Hypoderma robustum Tub. and Hypodermella abietis-concoloris (Mayr) Dearn. At Hole-in-the-Ground near Mineral practically all the pole-sized white fir were infected.

PINE NEEDLE CAST

Pine needle cast (Hypodermella medusa Dearn.) was observed on ponderosa pine in Trinity, Shasta, and Plumas Counties. It was reported on Jeffrey pine from Shasta County. No heavy infection centers were reported.

DOUGLAS-FIR NEEDLE CAST

Although Douglas-fir needle cast (Rhabocline pseudotsugae Syd.) was rather heavy in the Coast Range during 1956, it was generally less active during 1957.

TRUE MISTLETOES

The true or leafy mistletoe (Phoradendron pauciflorum Torr.) on white fir was reported from El Dorado, Amador, and Tuolumne Counties southward to Los Angeles County. Many tops of mature trees from Calaveras County southward have been either killed or so weakened that they were prime for attack by fir engraver beetles. Another species of true mistletoe (P. libocedri Howell) attacks cedar and is widely distributed throughout the State. The pest reduces growth of mature trees.

FOMES ROOT DISEASE

The root disease (Fomes annosus (Fr.) Cke.) continues to kill scattered patches of young trees of ponderosa and Jeffrey pine in the old logged-over areas in the eastside Sierra type.

LEPTOGRAPHIUM ROOT DISEASE

The Leptographium root disease (Leptographium sp.) continued to kill some pole-size ponderosa and Jeffrey pine at the Blacks Mountain Experimental Forest in Lassen County. It was also found to be killing small groups of ponderosa pine in northeastern Amador County.

ARMILLARIA ROOT DISEASE

This root disease (Armillaria mellea (Vahl.) Quel.) is widely distributed in all forest types of the State and frequently kills coniferous reproduction as well as larger trees. During 1957 it was especially active on white fir from three areas in Shasta County.

UNKNOWN DISEASES

Southern California land managers are still greatly concerned about the unknown decline ("X" disease) of ponderosa pine in the Crestline and Arrowhead areas in San Bernardino

Figure 9. Incense-cedar is a highly susceptible host for th true mistletoe.

County. The disease made considerable spread to the north and northeast during the past season. The needles on many trees turn a gray yellow, often following a mottled pattern, and then drop. The cambium retains its normal appearance for a time and is apparently attractive to bark beetles. This disease is complicating the insect control work being done in this area by lowering the vigor of residual trees.

A foliage disease of lodgepole pine has been causing some mortality near Tuolumne Meadows in Yosemite National Park. What appears to be the same disease was reported near Strawberry in Tuolumne County, at several places along Clarks Fork River in Alpine County, and near Dinkey Creek in Fresno County. Needles from the Strawberry center showed Coryneum cinereum. This same organism may be the cause of lodgepole damage reported from the other area.

An unknown canker disease that has been killing branches of white fir trees at Evans Flat in Kern County was reported again in that area.

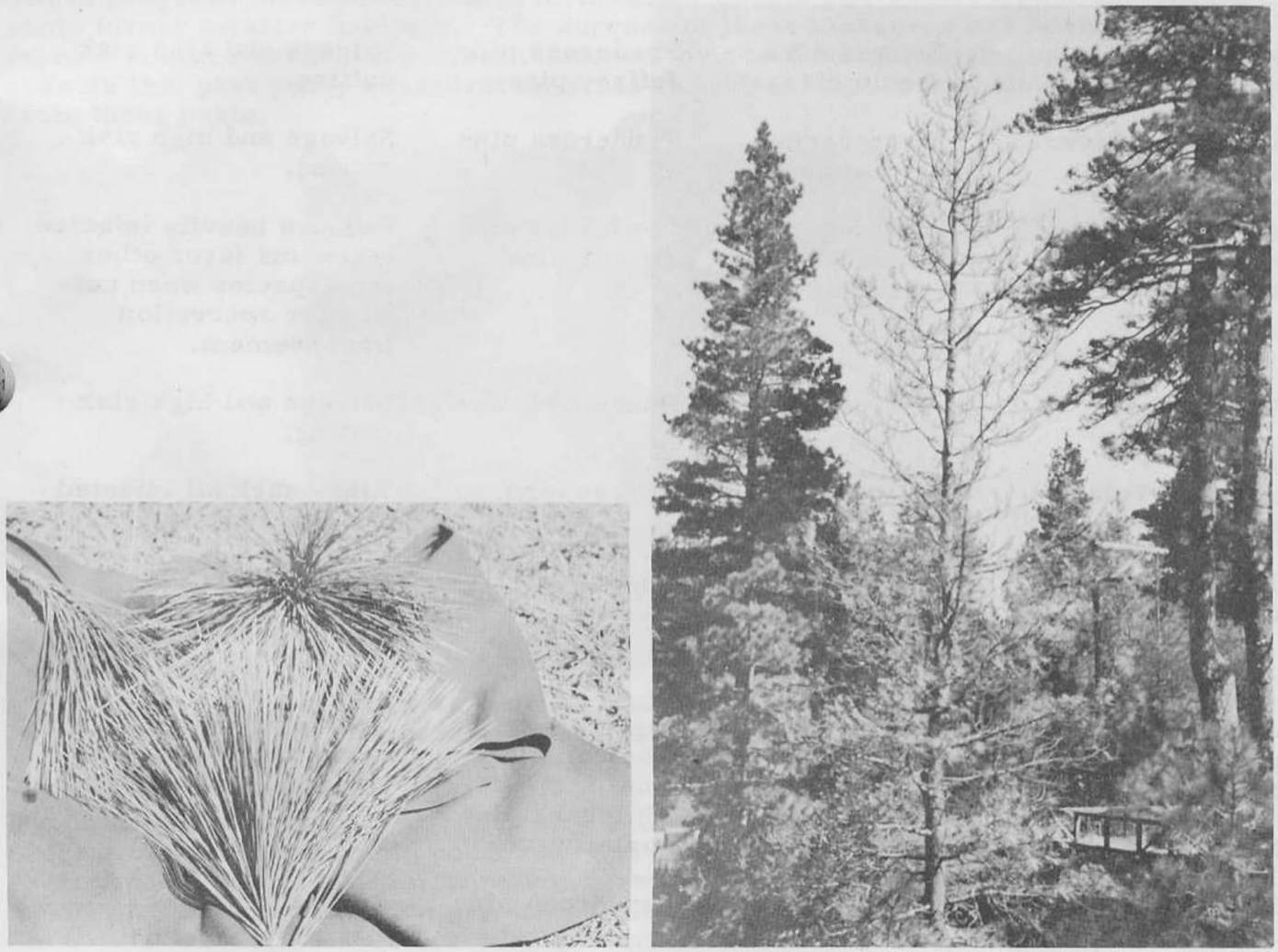


Figure 10. Closeup of tip browning, yellow flecking and banding of ponderosa foliage (left), typical defoliation and damage to ponderosa pine pine (right) caused by an unknown needle blight. Arrowhead-Crestline area of southern California.

STATUS OF FOREST DISEASES AND RECOMMENDED ACTION

Location	Disease	Host Trees	Recommended action
Commercial forests of entire State	Dwarfmistletoe	Red fir Ponderosa pine Jeffrey pine Sugar pine Douglas-fir White fir	Where economically feasible, control by silvicultural methods and by sanitation cutting and pruning at time of logging.
Kern River Recreational Areas	Dwarfmistletoe	Digger pine	Control through sanitation cutting and pruning. Eradicate all female mistletoe plants as minimum control measure.
Kern County	Elytroderma needle disease	Ponderosa pine Jeffrey pine	Salvage and high risk cutting.
Mokelumne River	Elytroderma needle disease	Ponderosa pine	Salvage and high risk cutting.
Lake Tahoe and Lassen Volcanic National Park	Elytroderma needle disease	Ponderosa pine Jeffrey pine	Remove heavily infected trees and favor other tree species when cutting for recreation improvement.
Glenn County	Elytroderma needle disease	Ponderosa pine	Salvage and high risk cutting.
Mono and Tulare Counties	Limb rust	Jeffrey pine	Risk-mark all infected trees for cutting.
Sierra Nevada and North Coast Ranges	White pine blister rust	Sugar pine	Control by ribes removal in approved sugar pine management units.
Lassen Volcanic, Yosemite, and Sequoia-Kings Canyon National Parks	White pine blister rust	Sugar pine Western white pine Whitebark pine Foxtail pine	Control by ribes removal for areas having high aesthetic or Park values
San Bernardino County	Unknown physiological injury	Ponderosa pine	Research needed.

STATUS OF FOREST ANIMAL PESTS DURING 1957

Very little specific information is available on the abundance of forest animal pests in the State during 1957. Observations late in the year indicated that forest seed-eating rodents were much more numerous than usual, despite the failure of the seed crop. Porcupine populations in the fall were also high, especially in northeastern California, according to reports from national forests. Other animals abundant enough to be pests are bear, deer, rabbits, squirrels and seed-eating birds, but the extent of their depredations is not known.

Ordinarily, the greatest economic loss from forest animals is due to seed-eating rodents that destroy the coniferous seed crop. Both poison baits and repellents have been used in regeneration areas to control these pests. On 5 national forests, 6,300 acres were baited, mostly by aerial applications. In addition, 1,500 acres were seed-spotted with seed treated with repellents. Trials with repellents also are in progress on state forests in Mendocino, Shasta and Tulare Counties, and on some forest industry holdings. The success of these measures has been variable; more trials are needed to perfect them. In view of the high population of seed-eating rodents this past year, regeneration areas in 1958 are apt to be under heavy pressure from these pests.

Figure 11. Baiting a rodent trap with rolled oats to estimate rodent population before control.

Porcupine damage occurred statewide, except in southern California. The most serious damage has been in ponderosa and Jeffrey pine in northeastern California. Porcupines are controlled with poison or by hunting. Neither has proven altogether effective. In 1957, for example, the Modoc National Forest, in cooperation with the U.S. Fish and Wildlife Service, attempted to control porcupines on a 20,000-acre area near Adin. In spite of an intensive campaign from mid-June through August, the area was not rid of porcupines because more of them moved in.

Bear damage was quite localized, and was restricted to second-growth redwood stands in Del Norte and Humboldt Counties. Deer damage to forest tree regeneration was not of major consequence in the State this year.

The need for better methods and more effort to control forest animal pests, particularly seed-eating rodents and porcupines, was recognized by the Action Council. The Council has requested the Bureau of Sports Fishery and Wildlife, U.S. Department of Interior, to allocate one full man-year to research on the control of seed-eating rodents, and to assign a qualified zoologist to study the biology and control of porcupines in this State and in Oregon.